

Two new species of *Metapenaeopsis* (Crustacea: Decapoda: Penaeidae) from south Western Australia

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Abstract

Two new species of penaeid prawn, *Metapenaeopsis fusca* and *Metapenaeopsis lindae* are described from shallow south Western Australian waters. *M. fusca* can be separated from all other members of the genus by the strongly smooth convex dorsal carina of the third abdominal somite, and a short pterygostomial spine. *M. lindae* can be distinguished by the position of the stridulating organ, longitudinally grooved dorsal carina of the third abdominal segment, long pterygostomial spine and the apical processes on the male petasma.

Introduction

The genus *Metapenaeopsis* (Bouvier) comprises approximately 50 species that inhabit a wide range of substrates and depths. The genus in Australian waters was last reviewed by Racek and Dall (1965) and taxonomically is regarded as one of the most complex of penaeid genera.

The two species described in this paper were collected together in a 3 mm mesh hand trawl net during a sampling programme for juvenile king prawns, *Penaeus latisulcatus* at Mangles Bay, in Cockburn Sound, Rockingham (32°16'S, 115°43'E), Western Australia. Subsequently further representatives of both species were collected from commercial trawlers operating outside the Sound.

The nomenclature of morphological criteria used in the following descriptions is to be found in Kubo (1949), Dall (1957) and Racek and Dall (1965). Body length (B.L.) was measured from the post-orbital margin to the tip of the telson. Abdominal segments were measured as a percentage of B.L. The material examined is housed in the Western Australian Museum, Perth (WAM).

Systematics

Metapenaeopsis fusca sp. nov.

Figure 1 A-D; Tables 1, 2

Holotype

WAM 369-87, female 19 mm C.L., 74 mm B.L., coll. S. Boocock, Singleton, south Western Australia, (32°27'S, 115°44'E); 18 May 1987.

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Paratypes

WAM 370-87, male 9 mm C.L., 45 mm B.L., coll. R. & L. Manning, Mangles Bay, Rockingham, south Western Australia (32° 16'S, 115° 43'E); 13 May 1987.

WAM 371-87, 2 males: 9 mm C.L., 44 mm B.L.; 11 mm C.L., 50 mm B.L., coll. R. & L. Manning, Mangles Bay, Rockingham, south Western Australia; 11 June 1987.

WAM 372-87, 2 females: 9 mm C.L., 41 mm B.L., 12 mm C.L., 53 mm B.L., 2 males: 10 mm C.L., 45 mm B.L., 10 mm C.L., 47 mm B.L., coll. R. & L. Manning, Mangles Bay, Rockingham, south Western Australia; 27 May 1986.

Diagnosis

The new species can be distinguished from all other *Metapenaeopsis* (except *Metapenaeopsis lamellata*) by the presence of the strongly convex "bulge-like" dorsal carina on the third abdominal segment which is not grooved longitudinally on the upper surface. It is closest to *Metapenaeopsis barbata* (Figure 1 E-G), a Japanese species described by Kubo (1949). Differences between this species are given in Tables 1 and 2. Colouration is dark chocolate-brown, and unusual colour for penaeids.

Description

Measurements and counts are presented in Table 2.

Mean number of dorsal rostral teeth 7+ epigastric; range 6-8 teeth. Rostra of males and females dimorphic; male rostrum horizontal, curving upwards after 5th+ epigastric tooth and tapering to sharp slightly down turned tip; female rostrum gradually upturned from base, tapering to sharp slightly downturned tip. Rostrum reaching middle of the third segment of peduncle. First rostral tooth forward of frontal margin of carapace. Adrostral carina strongly curved posteriorly into ridge of frontal margin of carapace.

Carapace entirely tomentose; all sulci obscured by dense setae; orbital spine minute; orbital-antennal sulcus shallow; postocular sulcus well defined; antennal spine well developed, carina feeble; pterygostomial spine short and sharp; hepatic spine moderately large, cervical and hepatic sulci deep and distinct (when setae removed); stridulating organ (Figure 1 B) narrow, slightly upcurved, with 16-28 ridges (averaging 22 on small specimens, 23 on large specimens).

Antennular flagella moderately short, lower flagella hirsute, slightly longer than upper, minutely pubescent flagella. Prosartema and stylocerite exceeding anterior margin of eye and reaching posterior of second segment. Distolateral spine long and slender, pointing anteriorly.

Third maxilliped reaching middle of second antennular segment. Dactyl of first pereopod reaching base of fourth antennal segment, ischial spine prominent; second pereopod chela just exceeding base of flagellum; third pereopod exceeding by dactyl anterior of fifth antennal segment; fourth pereopod reaching anterior edge of bascerite; fifth pereopod reaching anterior of fourth antennal segment, base of coxae posteriorly pubescent with margins fringed with setae.

Abdomen tomentose in extensive patches; second abdominal somite with short dorsal carina; third somite with prominent dorsal convex carina lacking sulcus;

fourth to sixth somite with strong carina, sixth ending in small tooth. Sixth segment ranging from 14-18 per cent of body length, (mean 16 per cent). Telson shorter than uropods ranging from 16-19 per cent of body length, (mean 17 per cent), armed with three mobile pairs and one fixed pair of spines. Apical spine short.

Thelycum (Figure 1C): Sternum between the second pereopods with two long spinous processes. Bilobed plate between third pereopods. Thelycal anterior plate flat, elliptical, fringed anteriorly with setae. Intermediate plate deeply concave with raised lateral ridges abutting coxal of fifth pereopods, extending laterally 45° for

Table 1 Major differences in morphological characters between *Metapenaeopsis fusca* and *M. barbata*.

Characters	<i>M. fusca</i>	<i>M. barbata</i>
Stridulating organ.	Narrow, slightly upcurved.	Deep, strongly upcurved.
3rd abdominal somite, dorsal carina.	Strongly convex, strongly curved when viewed laterally; 'hump-back' appearance.	Flat, slightly curved when viewed laterally.
Pterygostomial spine.	Short, not reaching to basicerite.	Large, reaching more than half length of basicerite.
Telson.	Not reaching endopod of uropod.	Exceeding endopod of uropod.
Thelycal anterior plate.	Almost circular.	± Oblong, minute anterior point.
Thelycal middle plate.	Extending laterally well outside inner tips of coxal projections of 4th pereopods.	Extending laterally about as far as inner tips of coxal projections of 4th pereopods.
Thelycal posterior plate.	Groove separating it from middle plate deep and of uniform width.	Groove separating it from middle plate with two triangular depressions.
Petasma.	Irregular processes pointing apically.	Small almost regular processes pointing apically and radiating around inner lateral left distoventral projection.
Geographical location.	South-west of Western Australia.	Japanese waters and Borneo.

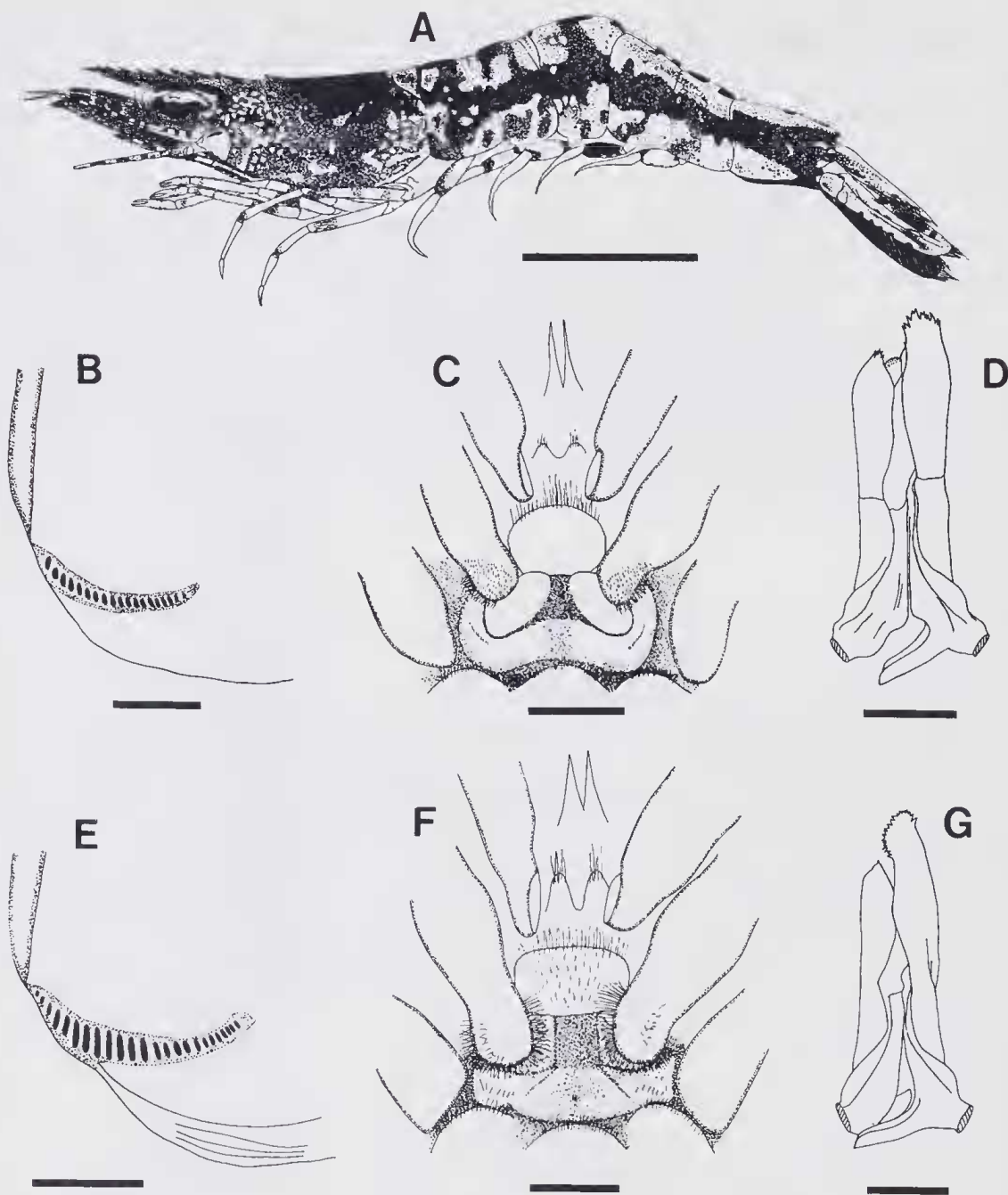


Figure 1 *Metapenaeopsis fusca* and *M. barbata*. (Scales: A = 20 mm, B-G = 2 mm).

- A. *M. fusca*, female: lateral view of holotype.
 B. *M. fusca*, stridulating organ.
 C. *M. fusca*, female: thelycum.
 D. *M. fusca*, male: ventral view of petasma.

- E. *M. barbata*, stridulating organ.
 F. *M. barbata*, female: thelycum.
 G. *M. barbata*, male: ventral view of petasma.

Table 2 Meristic measurements and morphometric characters of *Metapenaeopsis fusca* and *M. barbata*.

Characters	Metapenaeopsis fusca		Metapenaeopsis barbata	
	Rockingham	Singleton	Japan	Borneo
6th Segment				
Mean % of body length	16.0±0.62	15.3±0.21	19.4	-
Range of measurements	14.9-17.5	15.1-15.5	-	-
Number measured	21	3	1	-
Telson				
Mean % of body length	17.3±0.67	17.0±0.06	21.2	-
Range of measurements	16.1-18.5	17.0-17.1	-	-
Number measured	21	3	1	-
Epigastric tooth				
% of carapace length	69.5±1.84	72.2±2.63	74.7±2.19	-
Range of measurements	65.7-73.9	70.3-75.2	73.1-76.2	-
Number measured	21	3	2	-
Rostral teeth				
Usual no. rostral teeth	7-8	6-8	6 (Kubo)	7 (Kubo)
Range of measurements	6-8	6-8	6-7 (Kubo)	6-7 (Kubo)
Number measured	20	2	-	-
Stridulating organ				
Usual no. of ridges	22-23	20-28	mostly 20-23 (Kubo)	mostly 18-20 (Kubo)
Range of measurements	16-25	20-28	18-25 (Kubo)	13-23 (Kubo)
Number measured	21	3	-	-
Petasma :				
Right d. v. projection				
Usual no. apical processes	4	-	-	-
Range of measurements	1-6	-	3-1 (Kubo)	-
Number measured	10	-	-	-
Left d. v. projection				
Usual no. apical processes	9	-	-	-
Range of measurements	4-10	-	7-12 (Kubo)	-
Number measured	10	-	-	-

short distance. Anterior sternal plate between fifth pereopods medially depressed and curved anteriorly, extending laterally to raised ridge encompassing 45° ridges of intermediate plate and extending anteriorly and laterally behind the fifth coxae, forming deep groove between two plates. Posterior sternal plate tri-lobed,

with deep wide groove between mid-lobe and middle of posterior of anterior plate.

Petasma (Figure 1D) left distroventral projection narrow, larger than right, widest in distal 1/3, distally carrying a cluster of 4-10 (usually 8) mixed short and long pointed processes. Right distoventral projection narrowing towards apex, carrying distally 1-6 (usually 4) pointed processes.

Colour in life: the translucent-white body surface is overlaid with extensive dark chocolate-brown mottling, forming a distinctive wide lateral line along the abdomen. Basal pereopods are aqua-blue with blue flecks along lower lateral side of the carapace when freshly collected. The fourth pleopods are characteristic chocolate-brown in colour.

Distribution

Metapenaeopsis fusca is known only from a relatively restricted area of south Western Australia, ranging from Singleton (32°27'S, 115°44'E) to Cockburn Sound (32°8'S, 115°45'E to 32°16'S, 115°41'E). It has been collected from depths ranging from one to 20 metres over a substrate consisting of seagrass meadows of *Posidonia* interspersed with areas of bare sand. The species is considered to be uncommon to rare throughout its range.

Remarks

Specimens of this species have been collected previously during trawl surveys by the Western Australian Fisheries Department and lodged with the Western Australian Museum. Details of the trawls have been published by Penn (1977) and Heald and Walker (1982). The specimens were incorrectly identified as *Penaeopsis/Metapenaeopsis novaeguineae* (Haswell).

Etymology

The species is named *fusca* (from latin fuscus = dark) in recognition of its unique dark (chocolate-brown) colouration.

Additional material examined

M. fusca

WAM 98-87, 2 females: both 11 mm C.L., 2 males: both 10 mm C.L. (as *Metapenaeopsis novaeguineae*); coll. R.J.G. Manning, Mangles Bay, Rockingham (32°16'S, 115°43'E), south Western Australia; 15 July 1987.

WAM 106-87, male, 12 mm C.L.; female, 18 mm C.L.; coll. S. Slack-Smith and A.A. Paterson, Cockburn Sound off Rockingham, Kwinana, south Western Australia, 25-26 February 1970.

WAM 107-87, female, 12 mm C.L., (as *Metapenaeopsis novaeguineae*); coll. D. Heald, Cockburn Sound, (32°12'20"S, 115°4'22"E), south Western Australia, 15 September 1972.

WAM 109-87, male, 7 mm C.L., (as *Metapenaeopsis novaeguineae*); coll. H. Merrifield, Cockburn Sound, south of Jervis Groyne, (32°11'12"S, 115°44'8"E), south Western Australia, 6 October 1975.

WAM 112-87, male, 13 mm C.L., (as *Penaeopsis novaeguineae*); coll. M.H. Shepherd, between Woodman's Point and north of Garden Island, south Western Australia, 17 March 1971.

M. barbata

WAM 391-87, male, 14 mm C.L.; coll. M. Toriyama, Mimase Fish Markets, Kochi Pref., Japan, 29 September 1984.

WAM 392-87, female, 21 mm C.L.; coll. M. Toriyama, Tosa Bay, Kochi Pref., Japan, March 1974.

Metapenaeopsis lindae sp. nov.

Figure 2 A-D; Tables 3, 4

Holotype

WAM 373-87, female, 19 mm C.L., 77 mm B.L. (one antennae missing); coll. G. Davis, Bell Buoy, NW Rottnest Island (31°59'S, 115°34'E), south Western Australia; 19 May 1987.

Paratypes

WAM 374-87, male, 11 mm C.L., 52 mm B.L.; data as for holotype.

WAM 375-87, 3 females: 13 mm C.L., 58 mm B.L.; 14 mm C.L., 62 mm B.L.; 14 mm C.L., 62 mm B.L.; 3 males: 11 mm C.L., 53 mm B.L.; 11 mm C.L., 52 mm B.L.; 11 mm C.L., 54 mm B.L.; coll. S. Boocock, Singleton (32°27'S, 115°44'E), south Western Australia; 18 May 1987.

WAM 376-87, 3 females: 6 mm C.L., 31 mm B.L.; 8 mm C.L., 39 mm B.L.; 10 mm C.L. (+ parasitic isopod), 48 mm B.L.; 2 males: 5 mm C.L., 25 mm B.L.; 8 mm C.L., (+ parasitic isopod), 41 mm B.L.; 3 unsexed: 3 mm C.L., 16 mm B.L.; 4 mm C.L., 17 mm B.L.; 4 mm C.L., 17 mm B.L.; coll. R. & L. Manning, Mangles Bay, Rockingham (32°16'S, 115°43'E), south Western Australia; 11 June 1987.

Diagnosis

The new species is closest to the Japanese species *Metapenaeopsis acclivis* (Figure 2 E-G) described by Kubo (1949). Differences between the two species are given in Tables 3 and 4. The position of the stridulating organ which is raised on a ridge above the branchiostegite, longitudinally grooved dorsal carina of the third abdominal segment, long pterygostomial spine and the unique overall shape of the apical processes on the petasma are all diagnostic.

Description

Measurements and counts are given in Table 4.

Mean number of dorsal rostral teeth 8 + epigastric; range 7-9 teeth; female and male rostra near horizontal, slightly upcurving from fifth rostral tooth tapering to slightly downturned tip; tip of rostrum exceeding middle of third segment of peduncle — on large specimens, equal to or exceeding segment. First rostral tooth positioned behind frontal margin of carapace, Adrostral carina strongly curved posteriorly into ridge of frontal margin.

Carapace entirely tomentose; all sulci obscured by dense setae; orbital spine minute; orbital-antennal sulcus shallow; postocular sulcus deep and well defined; antennal spine long and sharp almost reaching eye; antennal carina feeble, sulcus wide and moderately deep; pterygostomial spine long and slender ending in sharp point; hepatic spine of medium size; hepatic and cervical sulci deep (when setae removed); long shallow depression present below cardiac region and posterior to

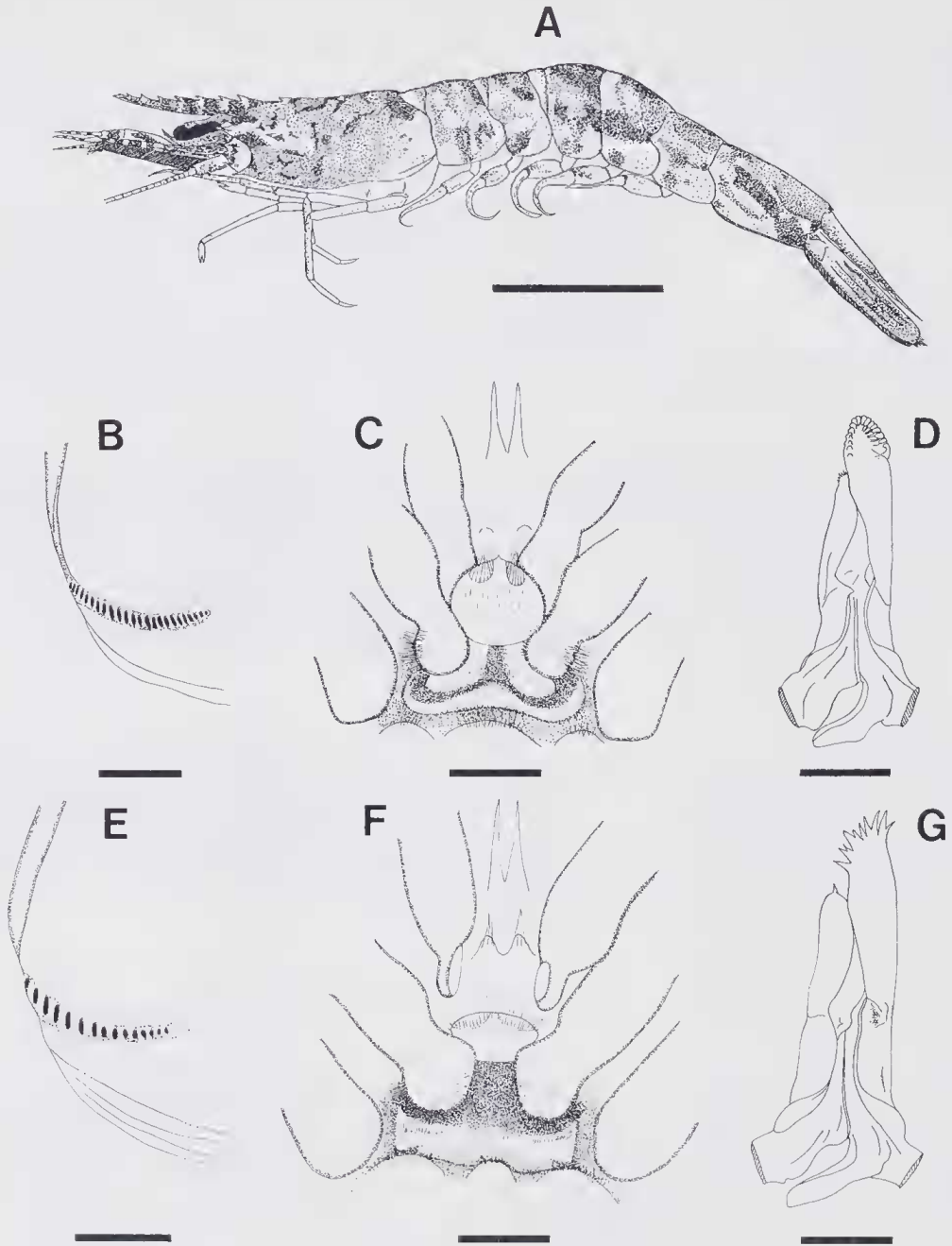


Figure 2 *Metapenaeopsis lindae* and *M. acclivis*. (Scale: A = 20 mm, B-G = 2 mm).

A. *M. lindae*, female: lateral view.

B. *M. lindae*, stridulating organ.

C. *M. lindae*, female: thelycum.

D. *M. lindae*, male: ventral view of petasma.

E. *M. acclivis*, stridulating organ.

F. *M. acclivis*, female: thelycum.

G. *M. acclivis*, male: ventral view of petasma.

Table 3 Major differences in morphological characters between *Metapenaeopsis lindae* and *M. acclivis*.

Characters	<i>M. lindae</i>	<i>M. acclivis</i>
Stridulating organ.	On ridge distinctly raised above level of branchiostegite.	Not markedly raised raised above level of branchiostegite.
3rd abdominal somite, dorsal carina.	Sulcus well defined, at least half length of carina.	Sulcus feeble, about one-third length of carina.
Telson.	Shorter than uropod.	Longer than uropod.
Thelycum anterior plate.	Almost circular with anterior point.	Rhomboidal or flabelliform.
Petasma.	Apical processes regular, pointing ventrally.	Slightly irregular apical processes radiating in horizontal plane of petasma.
Geographical location.	South-west of Western Australia.	Japanese waters.

pterygostomial region on branchiostegite; stridulating organ (Figure 2 B) posteriorly raised on ridge above the level of branchiostegite, narrow and slightly curved, with 17-26 ridges (averaging 22 on small specimens, 23 on large specimens).

Antennular flagella short, lower and upper flagella almost equal in length, lower flagella hirsute. Prosartema short not exceeding anterior margin of eye. Stylocerite reaching base of second antennular segment of peduncle. Distolateral spine moderately long, pointing 40° anterolaterally.

Third maxilliped almost reaching anterior of first antennular segment of peduncle. Dactyl of first pereopod reaching posterior of fifth antennal segment, ischial spine prominent; second pereopod exceeding by dactyl fourth antennal segment by dactyl; third pereopod exceeding by dactyl anterior of fifth antennal segment; fourth pereopod just exceeding anterior of fourth antennal segment; fifth pereopod reaching base of flagellum.

Abdomen tomentose in extensive patches; second abdominal somite with short dorsal carina; third somite with slightly raised carina with well defined sulcus occupying half length of carina; fourth to sixth somites with strong carina, sixth ending in small tooth. Sixth segment ranging from 17-20 per cent (mean 18 per cent) of body length. Telson marginally shorter than uropods, ranging from 16-20 per cent (mean 18 per cent) of body length, armed with three mobile pairs and one pair of fixed spines, apical spine very long and slender.

Thelycum (Figure 2 C): Sternum between second pereopods with two long spinous processes; between third pereopods, bilobed plate with small but distinct lobules positioned wide distance apart. Thelycal anterior plate flat, almost

circular with short anterior point, setae set in two shallow 'hollows' on either side of the anterior point; intermediate plate deeply concave with prominently raised lateral ridges abutting coxae of fifth pereopods; anterior sternal plate between fifth pereopods medially lightly depressed and curved anteriorly, extending laterally to distinct ridge, sharply curving anteriorly and laterally behind

Table 4 Meristic measurements and morphometric characters of *Metapenaeopsis lindae* and *M. acclivis*.

Characters	Metapenaeopsis lindae				M. acclivis
	Rockingham	Singleton	Rottnest Is.	Peel Harvey Estuary	Japan
6th Segment					
Mean % of body length	18.0±0.73	18.1±0.78	17.9±0.88	17.2±0.72	17.5±0.47
Range of measurements	17.0-19.5	16.6-19.3	16.5-19.7	16.2-18.2	17.0-18.1
Number measured	11	22	20	10	4
Telson					
Mean % of body length	18.2±0.58	18.3±1.16	18.4±0.48	17.8±0.84	20.0±0.79
Range of measurements	17.5-19.3	16.4-20.4	17.2-19.2	16.7-18.9	19.2-20.1
Number measured	11	21	20	10	4
Epigastric tooth					
% of carapace length	72.5±2.22	74.4±2.49	72.9±1.92	71.9±3.94	75.1±0.90
Range of measurements	66.7-74.9	69.7-78.9	68.1-75.9	62.5-76.0	74.2-76.3
Number measured	11	22	20	10	4
Rostral teeth					
Usual no. rostral teeth	8	8	8	8	6 (Kubo)
Range of measurements	7-9	7-9	8-9	7-9	6-7 (Kubo)
Number measured	10	19	19	10	-
Stridulating organ					
Usual no. of ridges	23	21-23	23	24	-
Range of measurements	18-24	18-26	17-26	20-26	13-18 (Kubo)
Number measured	11	22	20	10	-
Petasma :					
Right d. v. projection					
Usual no. apical processes	3-4	4	3-5	-	several (Kubo)
Range of measurements	3-4	1-4	3-6	-	-
Number measured	5	5	7	-	-
Left d. v. projection					
Usual no. apical processes	9	8	11-14	-	many (Kubo)
Range of measurements	9-13	8-15	9-16	-	-
Number measured	5	5	7	-	-

fifth coxae forming deep wide groove between intermediate and anterior sternal plates. Posterior sternal plate tri-lobed, median lobe large, forming deep wide groove between two sternal plates.

Petasma (Figure 2 D) with left distoventral projection larger than right, widest at apical 1/3, distally carrying 8-16 regularly arranged laterally pointing apical processes, (resembling a fist without the thumb); right distoventral projection widest at upper 1/3, distally carrying 1-6 small pointed processes.

Colour in life: The background colour of the whole body is translucent white to light pink-brown overlaid by scattered light to dark red-brown markings. The colour pattern varies between juvenile and adult prawns and habitat. Bases of the pereopods and pleopods and the ventral surface of carapace are chalky white in large specimens. The uropods are dark red-brown.

Distribution

Metapenaeopsis lindae is a widespread southern Australian species ranging from Smoky Bay, South Australia (32°20'S, 133°45'E) to north west of Rottneest Island (31°59'S, 115°34'E). Habitats include sand, limestone reefs and seagrass meadows. The species is very common at Singleton (32°27'S, 115°44'E) and at Rockingham (32°16'S, 115°43'E).

Remarks

This species has been previously collected from Cockburn Sound during Western Australian Fisheries Department trawl surveys (Penn 1977) and specimens were lodged in the Western Australian Museum. Most specimens in the WAM collection were incorrectly identified as *Penaeopsis/Metapenaeopsis novaeguineae*.

Individuals of *M. lindae* were often infected with bopyrid parasite under the postero-lateral area of the carapace.

Etymology

This species was named in honour of my wife, Linda.

Additional material examined

M. lindae

WAM 94-87, female, 10 mm C.L.; male, 10 mm C.L., (as *Penaeopsis novaeguineae*); coll. R. Lenanton, Hardy Inlet (34°17'S, 115°10'E), south Western Australia; June 1976.

WAM 96-87, male, 12 mm C.L., (as *Penaeopsis novaeguineae*); coll. R. Stannard, (32°16'5''S, 115°36'0''E); 7 July 1977.

WAM 99-87, female, 14 mm C.L., (as *Penaeopsis novaeguineae*); coll. R.W. George and N. Sarti, 4.5 miles west of south channel (32°15'15''S, 115°39'9''E); 29 June 1977.

WAM 100-87, female, 11 mm C.L., (as *Metapenaeopsis novaeguineae*); coll. unknown, Smoky Bay, South Australia; 5 July 1953.

WAM 351-87, male, 12 mm C.L., (posterior of body missing), female, 15 mm C.L.; coll. unknown, north east Rottneest Island, 18 September 1965.

M. acclivis

WAM 393-87, 2 males: 13 mm C.L., 15 mm C.L., 2 females: 16 mm C.L., 19 mm C.L.; coll. K. Kojima, Yuya Bay, Yamaguchi Pref., Japan, about 1976.

Discussion

Specimens of both new species, collected prior to this study and housed at the Western Australian Museum, were identified as tropical Australian species, *Metapenaeopsis novaeguineae* (Haswell) which has similar dark colouration to *M. fusca*. The features of *Metapenaeopsis novaeguineae* that clearly distinguish the species from both *M. lindae* and *M. fusca* are the number of stridulating ridges (11-17) very broad thelycal anterior plate, number of apical projections on the left distoventral projection (10-15), and the raised, flat topped dorsal carina on the third abdominal segment (Racek and Dall 1965).

The two new species are often caught together and may be distinguished when fresh by their colouration. After preservation in alcohol, *M. lindae* can be recognised by the stridulating ridges, dorsal carina of the third segment, long pterygostomial spine and male petasma. *M. fusca* is easily separated by the obvious smooth convex dorsal carina on the third abdominal segment. Only one other species, *Metapenaeopsis lamellata* (de Haan) has a well defined salient dorsal carina on the third abdominal segment and can be separated from *M. fusca* by the whole prawn's unique appearance. *M. lamellata* has been described by Kubo (1949) and partially by Racek and Dall (1965).

On the basis of photographs of live specimens of the two Japanese species, *M. barbata* and *M. acclivis*, provided by Professor K. Hayashi, it is apparent *M. fusca* and *M. barbata* can be distinguished by colouration when fresh, whilst *M. lindae* and *M. acclivis* are very similar in colour pattern.

Thelycal structures of *M. fusca* and *M. lindae* have similarities to those of other Australian *Metapenaeopsis* species; *M. crassissima* Racek and Dall, *M. palmensis* (Haswell), *M. rosea* Racek and Dall, *M. novaeguineae* (Haswell) and *M. stridulans* (Alcock) and also to the Japanese species *M. dura* (Kubo) where the median plates of the thelyca abutt to form a 'W' shaped posterior plate. The sexual organs of both sexes of *M. lindae* are very similar in morphology to those of *M. crassissima*, a common penaeid in north-western Australia (Grey *et al.* 1983). It seems likely that the record of *M. crassissima* off the South Australian coast (Grey *et al.* 1983) was the closely related and southern *M. lindae*.

Acknowledgements

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of Fisheries, Japan, for sending me specimens and colour photographs of *Metapenaeopsis acclivis* and *barbata*. Both Dr W. Dall and Professor I. Potter criticised the manuscript.

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